

thelemanniana, *Melaleuca acerosa*, *M. huegelii* and *Phyllanthus calycinus* grew from underground lignotubers and runners etc. A few of the species, however, grew from damaged branches above ground. These included *Hakea prostrata*, *Petrophile serruriae* and one, two metre high *Dryandra sessilis* bush (the only one in the hollow to survive).

Many of the *Acacia rostellifera* plants in a nearby thicket in the same depression as the heath but in deeper soil also died but some, though defoliated, has recovered by growing from above ground stems.

It was observed (1980) on the higher ground on the limestone heath that the population of the co-dominant, shallow rooted *Acacia truncata* contained many dead bushes which had been affected by drought and/or insect attack. It would appear therefore that the possession of substantial underground parts is advantageous for more reasons than drought or fire.

UTILIZATION OF A PERTH METROPOLITAN WETLAND BY WATER BIRDS

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INTRODUCTION

Wetlands on the Swan Coastal Plain provide an important habitat for many species of water birds in Western Australia. They are particularly important as summer refuges for birds that have left inland areas where lakes, filled by winter rains, dry out (Anon. 1978). Yet, 49% of the original wetlands between Yanchep and Harvey have been destroyed since European settlement of the region (Riggert 1966), thus drastically reducing the area available. It is therefore important to conserve as many of the remaining wetlands as possible and to understand what features of these wetlands are used by water birds.

This paper reports observations of the activities of the water birds on a small swamp in the Perth metropolitan area, and the parts of the swamp and its surrounds that were used by each species.

DESCRIPTION OF STUDY AREA

The study area consisted of the waters and surrounding vegetation of a permanent swamp lying close to the Nicholson Road Bridge over the Canning River in Ferndale, 11 km south-east of the city centre. The unnamed swamp lies in a paddock bounded by the Canning River, Nicholson Road, and the eastern boundary of the built-up area of Ferndale. It has an area of about 0.83 ha and lies in a paddock of low dense swards of grasses, sedges, and herbs, that are grazed by sheep, cattle, and horses. The vegetation of the swamp perimeter is typical of the local riverine environment, as described by Pen (1983). It is dominated by *Eucalyptus rudis* and *Melaleuca* spp., and extensive areas of *Typha orientalis* are found at the upper and lower ends of the swamp.

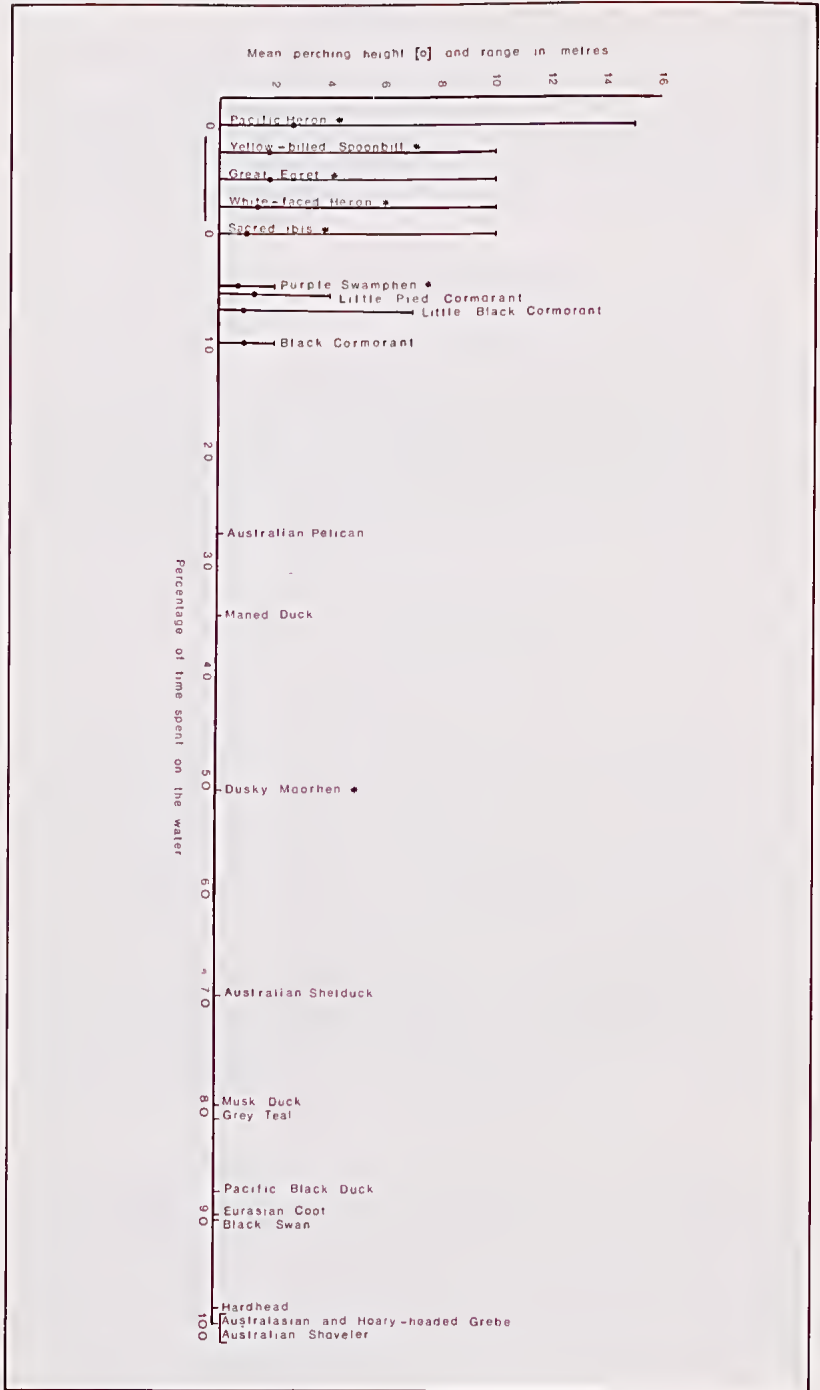
METHODS

From January 1978 to May 1981, observations were carried out between 0800 and 1100 hours, usually at weekly intervals. The activities and habitats of the birds were noted as I walked along the western margin of the swamp from the southern to the northern end. About half way along the open water of the swamp, the trunk of a fallen paperbark protruded horizontally into the water and provided a vantage point, from which further observations were made.

RESULTS

A total of 24 species were observed on the swamp or in its immediate vicinity. The utilization of the swamp and its surrounds by 21 of these species is summarized in Figure 1. (The three species excluded from the figure are Pied Cormorant, Rufous Night Heron, and Straw-necked Ibis, which were rarely seen). They range from the Little and Hoary-headed Grebe and the Australasian Shoveler, which were only ever seen on the water, to the Purple Swamphen and the Little Pied and Little Black Cormorant, which were almost always seen out of the water. Those species, for whom no heights are indicated, perched exclusively on very low branches or half-submerged logs around the swamp perimeter or on the bank. With the exception of Dusky Moorhen, which were frequently on land, only Grey Teal, Pacific Black Duck,

Figure 1. Species are arranged along the horizontal axis by percentage of observations during which they were on the water. The vertical axis indicates mean (●), and range of, perching heights. * shows species seen frequently away from water and the perimeter vegetation of the swamp.



and Hardhead were ever seen on the bank, and then rarely. The cormorants roosted almost exclusively on dead trees in the middle of the swamp, while ibis, heron, spoonbill, and egret used both these trees and living ones growing round the swamp's edge. The latter group of birds and the rails were also seen on the pasture of the paddock in which the swamp was situated. The rails, especially the Purple Swamphen, ranged through the grass at the southern end of the swamp and fed there during the winter months. Records of birds feeding are shown in Table 1.

No nests were found during this study, but very small, downy chicks were seen (Table 2), suggesting that breeding occurred at least in the immediate vicinity of the swamp.

Table 1. Percentages of observation sessions when species were recorded feeding. Only birds seen during more than 20% of sessions are included.*

Species	%
Australian Pelican	0
Black Swan	0
Great Egret	0
Maned Duck	0
Grey Teal	1.0
Pacific Black Duck	1.0
Little Pied Cormorant	1.7
Hardhead	2.3
Little Black Cormorant	7.1
Australian Shelduck	8.9
Little and Hoary-headed Grebe**	13.9
Dusky Moorhen	19.8
Purple Swamphen	23.3

* Less commonly observed birds also seen feeding were Musk Duck, White-faced Heron, Sacred and Straw-necked Ibis, and Yellowbilled Spoonbill.

** As I was unable to distinguish these two species, observations of them have been combined.

Table 2. Species seen with downy chicks.

Species	Time of year
Dusky Moorhen	December, January
Hardhead	October to December inclusive
Little and Hoary-headed Grebe	December to February inclusive, April
Pacific Black Duck	September, December

DISCUSSION AND CONCLUSIONS

Because the observations were always carried out in the morning, it is not possible to make comprehensive statements about how the birds used their environment and about the activities undertaken there. For example, Pacific Black Duck and Grey Teal do most of their feeding around the times of sunrise and sunset, and comfort movements are seen less frequently, and loafing more frequently, as the day passes (Norman et al. 1979). Conclusions drawn from observations, that were all made at the same time of day, are thus likely to give a false picture; they can, however, provide a basis on which the value of preserving the swamp environment can be judged.

Fourteen of the 24 species observed on the swamp were seen feeding; five were seen doing so relatively frequently. Four species nested near the swamp. All the species used the area for roosting and loafing. The swamp is of the type considered as the best water fowl habitat (Riggert 1966). It lacks only the beach and very shallow water habitats of the 'ideal' wetland (Anon. 1978). Margin, rush, and shallow to deep water habitats are all present and available for feeding and nesting. The manner in which birds made use of the water, the surrounding logs and trees, both living and dead, and the nearby paddock showed that all three habitats were valuable, especially the first two. In any plans for the future development of the swamp, the preservation of these

habitats needs consideration, and particular attention should be given to Pen's (1983) observation that the swamp-side vegetation has poor stability and is easily degraded by environmental change or disturbance, such as that caused by grazing stock.

This swamp is small by comparison with others in the surrounding area, and maintains only a small population of water birds. However, like many other small, isolated wetlands, it provides the ideal breeding habitat for several species of waterfowl. It also represents a relatively undisturbed summer refuge on the coastal plain, where 67% of wetlands are lost through evaporation during the summer and the fauna of many of the other permanent wetlands are greatly disturbed by man's activities (Seddon 1972).

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INTRODUCTION OF THE YABBIE, *CHERAX DESTRUCTOR* (DECAPODA: PARASTACIDAE) INTO SOUTHWESTERN AUSTRALIA

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INTRODUCTION

Representatives of the freshwater crayfish genus *Cherax* are conspicuous inhabitants of freshwater bodies, both natural and man-made, in the southwest of Western Australia (Shipway 1951; Riek 1967; Morrissy 1978a). Six species are recognised (Austin 1979; unpub.), five of which are endemic to the southwest: *C. crassimanus*, *C. glaber*, *C. preissii* (the koonac), *C. quinquecarinatus* (the gilgie) and *C. tenuimanus* (the marron). *Cherax destructor*, commonly known as the yabbie, has been introduced from the southeastern Australia. The introduction of the yabbie was first noted by Austin (1979) who referred then to the species as *C. albidus*, and Morrissy (1983) and Morrissy *et al.* (1984) have followed suit. Subsequent taxonomic studies have shown that *C. albidus* is a morphological variant of *C. destructor* and does not warrant separate specific recognition (Austin unpub.).

It is not widely realised that *C. destructor* has been introduced into the southwest because this species is generally confused with local *Cherax* species, particularly the koonac, *C. preissii*. The objectives of this paper are to: (1) document the present distribution of *C. destructor* in the southwest of Western Australia; (2) indicate diagnostic morphological characteristics of the species; and (3) discuss the possible consequences of this and future introductions.

DISTRIBUTION

The Western Australian Museum has records of *C. destructor* from 12 localities in the southwest, the earliest of which is dated January 1966 for specimens collected from a farm dam near the wheatbelt town of Corrigin. As part of a study of the distribution of *Cherax* spp. in the southwest, conducted in 1981 and early 1982, I collected samples of *C. destructor* from a further 17 locations. From these 29 locality records (Figure 1), it can be seen that *C. destructor* has been widely transplanted throughout the wheatbelt zone of Western Australia,